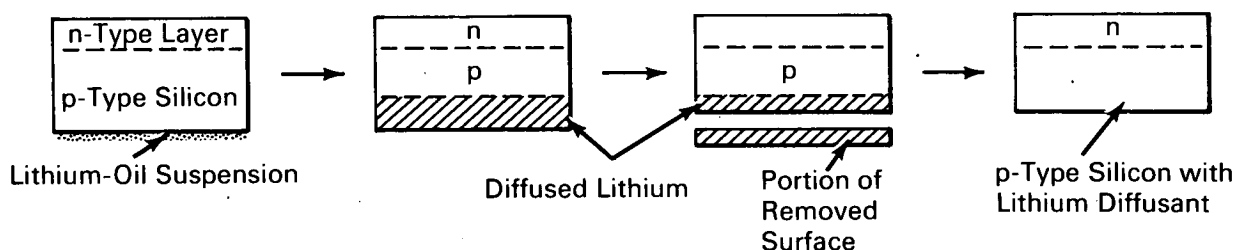


# NASA TECH BRIEF



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## Process Controls Introduction of Selected Impurities into Semiconductor Wafers



### The problem:

To devise a process for controlling the concentration of lithium diffused as a dopant, or impurity, into the base region of a diffused n-on-p silicon solar cell wafer.

### The solution:

A modified three-step process in which part of the surface layer of the base region of the p-type silicon containing the diffused dopant (lithium) is removed, prior to redistributing the remaining portion of the dopant into the bulk of the silicon wafer.

### How it's done:

Lithium is diffused into the base region of the silicon wafer using a coating of lithium suspended in oil as the diffusant source. Part of the surface layer on the base region is then chemically or mechanically removed to a depth less than that of the total penetration of the diffused lithium. The diffusant in the remaining portion of the surface layer is redistributed throughout the bulk of the silicon wafer by heat treatment.

### Notes:

1. The advantages of this process are that the final impurity concentration in the wafer can be closely controlled by adjusting the amount of surface layer removed, and the effects of surface alloying, generally encountered in the diffusion of metallic impurities as lithium, are eliminated.
2. This process, which has been specifically used for lithium doping of diffused n-on-p solar cell wafers, can be applied to other dopants and semiconductor materials.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Goddard Space Flight Center  
Greenbelt, Maryland 20771  
Reference: B67-10303

### Patent status:

No patent action is contemplated by NASA.

Source: A. R. Topfer and W. C. Bartholomay  
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under contract to  
Goddard Space Flight Center  
(GSFC-523)

Category 01